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1 **A P1500-Compatible Programmable BIST Aapproach for the Test of Embedded Flash Memories**   ◼
P. Bernardi, M. Rebaudengo, M. Sonza Reorda, M. Violante
March 2003 **Proceedings of the conference on Design, Automation and Test in Europe - Volume 1 DATE '03**
Publisher: IEEE Computer Society
Full text available: pdf(154.45 KB)
Publisher Site

Additional Information: full citation, abstract, index terms

In this paper we present a microprocessor-based approach suitable for embedded flash memory testing in a System-on-a-chip (SOC) environment. The main novelty of the approach is the high flexibility, which guarantees easy exploitation of the same architecture to different memory cores. The proposed approach is compatible with the P1500 standard. A case study has been developed and demonstrates the advantages of the proposed core test strategy in terms of area overhead and test application time.

2 **Pen computing: a technology overview and a vision**   ◼
André Meyer
July 1995 **ACM SIGCHI Bulletin**, Volume 27 Issue 3
Publisher: ACM Press
Full text available: pdf(5.14 MB)   Additional Information: full citation, abstract, citings, index terms

This work gives an overview of a new technology that is attracting growing interest in public as well as in the computer industry itself. The visible difference from other technologies is in the use of a pen or pencil as the primary means of interaction between a user and a machine, picking up the familiar pen and paper interface metaphor. From this follows a set of consequences that will be analyzed and put into context with other emerging technologies and visions.Starting with a short historic ...

3 **Logical and physical design issues for smart card databases**   ◼
Cristiana Bolchini, Fabio Salice, Fabio A. Schreiber, Letizia Tanca
July 2003 **ACM Transactions on Information Systems (TOIS)**, Volume 21 Issue 3
Publisher: ACM Press
Full text available: pdf(1.12 MB)   Additional Information: full citation, abstract, references, citings, index terms

The design of very small databases for smart cards and for portable embedded systems is

deeply constrained by the peculiar features of the physical medium. We propose a joint approach to the logical and physical database design phases and evaluate several data structures with respect to the performance, power consumption, and endurance parameters of read/program operations on the Flash-EEPROM storage medium.

Keywords: Design methodology, access methods, data structures, flash memory, personal information systems, smart card

4 Wide-area monitoring of mobile objects: Implementing software on resource-constrained mobile sensors: experiences with Impala and ZebraNet
Ting Liu, Christopher M. Sadler, Pei Zhang, Margaret Martonosi
June 2004 **Proceedings of the 2nd international conference on Mobile systems, applications, and services MobiSys '04**
Publisher: ACM Press

Full text available: pdf(3.14 MB)   Additional Information: full citation, abstract, references, citings, index terms

ZebraNet is a mobile, wireless sensor network in which nodes move throughout an environment working to gather and process information about their surroundings[10]. As in many sensor or wireless systems, nodes have critical resource constraints such as processing speed, memory size, and energy supply; they also face special hardware issues such as sensing device sample time, data storage/access restrictions, and wireless transceiver capabilities. This paper discusses and evaluates ZebraNet's syst ...

Keywords: event handling, middleware system, network communications, operation scheduling, sensor networks

5 Systems II: Hardware design experiences in ZebraNet
Pei Zhang, Christopher M. Sadler, Stephen A. Lyon, Margaret Martonosi
November 2004 **Proceedings of the 2nd international conference on Embedded networked sensor systems**
Publisher: ACM Press
Full text available: pdf(472.66 KB)   Additional Information: full citation, abstract, references, index terms

The enormous potential for wireless sensor networks to make a positive impact on our society has spawned a great deal of research on the topic, and this research is now producing environment-ready systems. Current technology limits coupled with widely-varying application requirements lead to a diversity of hardware platforms for different portions of the design space. In addition, the unique energy and reliability constraints of a system that must function for months at a time without human i ...

Keywords: GPS, ZebraNet, sensor deployment, sensor networks

6 eNVy: a non-volatile, main memory storage system
Michael Wu, Willy Zwaenepoel
November 1994 **ACM SIGPLAN Notices , ACM SIGOPS Operating Systems Review , Proceedings of the sixth international conference on Architectural support for programming languages and operating systems ASPLOS-VI**, Volume 29 , 28 Issue 11 , 5
Publisher: ACM Press

Full text available: pdf(1.32 MB)   Additional Information: full citation, abstract, references, citings, index terms

This paper describes the architecture of eNVy, a large non-volatile main memory storage

system built primarily with Flash memory. eNVy presents its storage space as a linear, memory mapped array rather than as an emulated disk in order to provide an efficient and easy to use software interface.Flash memories provide persistent storage with solid-state memory access times at a lower cost than other solid-state technologies. However, they have a number of drawbacks. Flash chips are ...

7   <u>Security as a new dimension in embedded system design: Security as a new dimension in embedded system design</u>

Srivaths Ravi, Paul Kocher, Ruby Lee, Gary McGraw, Anand Raghunathan
June 2004 **Proceedings of the 41st annual conference on Design automation**
Publisher: ACM Press

Full text available: <u>pdf(209.10 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

The growing number of instances of breaches in information security in the last few years has created a compelling case for efforts towards secure electronic systems. Embedded systems, which will be ubiquitously used to capture, store, manipulate, and access data of a sensitive nature, pose several unique and interesting security challenges. Security has been the subject of intensive research in the areas of cryptography, computing, and networking. However, despite these efforts, *security is ...*

Keywords: PDAs, architectures, battery life, cryptography, design, design methodologies, digital rights management, embedded systems, performance, security, security processing, security protocols, sensors, software attacks, tamper resistance, trusted computing, viruses

8   <u>Programming languages: Compiler-assisted demand paging for embedded systems with flash memory</u>

Chanik Park, Junghee Lim, Kiwon Kwon, Jaejin Lee, Sang Lyul Min
September 2004 **Proceedings of the 4th ACM international conference on Embedded software EMSOFT '04**
Publisher: ACM Press

Full text available: <u>pdf(392.66 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

In this paper, we propose a novel, application specific demand paging mechanism for low-end embedded systems with flash memory as secondary storage. These systems are not equipped with virtual memory. A small memory space called an execution buffer is allocated to page an application. An application-specific page manager manages the buffer. The manager is generated by a compiler post-pass and combined with the application image. Our compiler post-pass analyzes the ELF executable image of an appl ...

Keywords: SRAM, clustering, compilers, embedded systems, flash memory, heterogeneous memory, paging, post-pass optimization

9   <u>Illustrative risks to the public in the use of computer systems and related technology</u>

Peter G. Neumann
January 1996 **ACM SIGSOFT Software Engineering Notes**, Volume 21 Issue 1
Publisher: ACM Press
Full text available: <u>pdf(2.54 MB)</u>   Additional Information: <u>full citation</u>

10

Smart card evolution
Katherine M. Shelfer, J. Drew Procaccino
July 2002 **Communications of the ACM**, Volume 45 Issue 7
Publisher: ACM Press
Full text available: pdf(110.58 KB)   Additional Information: full citation, abstract, references, citings, index
         html(31.22 KB)   terms

Smart cards and their related technologies are an emerging component of electronic commerce worldwide. In some countries, they are revolutionizing aspects of commerce, healthcare, and recreation.

11 Embedded systems: applications, solutions and techniques (EMBS): A fast start-up technique for flash memory based computing systems
Keun Soo Yim, Jihong Kim, Kern Koh
March 2005 **Proceedings of the 2005 ACM symposium on Applied computing SAC '05**
Publisher: ACM Press
Full text available: pdf(324.29 KB)   Additional Information: full citation, abstract, references, index terms

Flash memory based embedded computing systems are becoming increasingly prevalent. These systems typically have to provide an instant start-up time. However, we observe that mounting a file system for flash memory takes 1 to 25 seconds mainly depending on the flash capacity. Since the flash chip capacity is doubled in every year, this mounting time will soon become the most dominant reason of the delay of system start-up time. Therefore, in this paper, we present instant mounting techniques for ...

Keywords: fast booting, fast mounting, flash memory, metadata snapshot

12 Algorithms and data structures for flash memories
Eran Gal, Sivan Toledo
June 2005 **ACM Computing Surveys (CSUR)**, Volume 37 Issue 2
Publisher: ACM Press
Full text available: pdf(343.39 KB)   Additional Information: full citation, abstract, references, index terms

Flash memory is a type of electrically-erasable programmable read-only memory (EEPROM). Because flash memories are nonvolatile and relatively dense, they are now used to store files and other persistent objects in handheld computers, mobile phones, digital cameras, portable music players, and many other computer systems in which magnetic disks are inappropriate. Flash, like earlier EEPROM devices, suffers from two limitations. First, bits can only be cleared by erasing a large block of memory. S ...

Keywords: EEPROM memory, Flash memory, wear leveling

13 Energy-aware design of embedded memories: A survey of technologies, architectures, and optimization techniques
Luca Benini, Alberto Macii, Massimo Poncino
February 2003 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 2 Issue 1
Publisher: ACM Press
Full text available: pdf(288.44 KB)   Additional Information: full citation, abstract, references, index terms

Embedded systems are often designed under stringent energy consumption budgets, to limit heat generation and battery size. Since memory systems consume a significant amount of energy to store and to forward data, it is then imperative to balance power consumption and performance in memory system design. Contemporary system design focuses on the trade-off between performance and energy consumption in processing and

storage units, as well as in their interconnections. Although memory design is as ...

Keywords: Embedded systems, embedded memories, integration, memories, nonvolatile, system-on-a-chip, volatile

14 Illustrating computer hardware concepts using PIC-based projects

Nurul I. Sarkar, Trevor M. Craig

March 2004 **ACM SIGCSE Bulletin , Proceedings of the 35th SIGCSE technical symposium on Computer science education SIGCSE '04**, Volume 36 Issue 1

Publisher: ACM Press

Full text available: pdf(450.28 KB)   Additional Information: full citation, abstract, references, index terms

We are developing a series of interesting projects that give students a hands-on introduction to computer hardware concepts. Our projects are designed around the PIC16F84, a powerful 8-bit microcontroller chip that sells for less than $10. The projects are suitable for classroom use in introductory level courses about computer hardware. The effectiveness of these projects has been evaluated both formally by students (student evaluation forms) and informally - through discussion within the teachi ...

Keywords: PIC microcontroller, computer hardware, hands-on experience

15 Services: ELF: an efficient log-structured flash file system for micro sensor nodes

Hui Dai, Michael Neufeld, Richard Han

November 2004 **Proceedings of the 2nd international conference on Embedded networked sensor systems**

Publisher: ACM Press

Full text available: pdf(291.68 KB)   Additional Information: full citation, abstract, references, index terms

An efficient and reliable file storage system is important to micro sensor nodes so that data can be logged for later asynchronous delivery across a multi-hop wireless sensor network. Designing and implementing such a file system for a sensor node faces various challenges. Sensor nodes are highly resource constrained in terms of limited runtime memory, limited persistent storage, and finite energy. Also, the flash storage medium on sensor nodes differs in a variety of ways from the traditiona ...

Keywords: eeprom, file system, flash, log structured, reliability, sensor

16 Floppies for the new millennium

Rick Moen

December 2003 **Linux Journal**, Volume 2003 Issue 116

Publisher: Specialized Systems Consultants, Inc.

Full text available: html(18.28 KB)   Additional Information: full citation, abstract

A practical guide to setting up and working with USB key chains.

17 Practitioners report: The parks PDA: a handheld device for theme park guests in squeak

Yoshiki Ohshima, John Maloney, Andy Ogden

October 2003 **Companion of the 18th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications**

Publisher: ACM Press

Full text available: pdf(488.82 KB)   Additional Information: full citation, abstract, references, index terms

The Parks PDA is a lightweight, handheld device for theme park guests that functions as a

combination guidebook, map, and digital camera. Together with a small team of artists and designers, we created a prototype Parks PDA and content for a three hour guest experience, including a camera interface, a hyper-linked guide book, three games, an animal spotters guide, a cross-referenced map, animated movies with lip-synched sound, a ride reservation system, and more. Over 800 visitors to Disney's An ...

Keywords: PDA, development environment, end-user software, handheld device, multimedia data management, rapid software development

18 Illustrative risks to the public in the use of computer systems and related technology

Peter G. Neumann
January 1992 **ACM SIGSOFT Software Engineering Notes**, Volume 17 Issue 1
Publisher: ACM Press
Full text available: pdf(1.65 MB)   Additional Information: full citation, citings, index terms

19 Highlights of ISSCC: high-speed heterogenous design techniques: A reconfigurable signal processing IC with embedded FPGA and multi-port flash memory

M. Borgatti, L. Calì, G. De Sandre, B. Forêt, D. Iezzi, F. Lertora, G. Muzzi, M. Pasotti, M. Poles, P. L. Rolandi
June 2003 **Proceedings of the 40th conference on Design automation**
Publisher: ACM Press

Full text available: pdf(402.77 KB)   Additional Information: full citation, abstract, references, citings, index terms

A 1GOPS dynamically reconfigurable processing unit with embedded Flash memory and SRAM-based FPGA targets image-voice processing and recognition applications. Code, data and FPGA bitstreams are stored in the embedded Flash memory and are independently accessible through 3 content-specific, 64-bit I/O ports with a peak read rate of 1.2GB/s. The system is implemented in a 0.18um, 2PL-6ML CMOS Flash technology, chip area is 70mm2.

Keywords: application-specific integrated circuits (ASICs), digital signal processors, field-programmable gate arrays (FPGAs), integrated circuit design, multimedia computing, reconfigurable architectures

20 Security on FPGAs: State-of-the-art implementations and attacks

Thomas Wollinger, Jorge Guajardo, Christof Paar
August 2004 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 3 Issue 3
Publisher: ACM Press
Full text available: pdf(296.79 KB)   Additional Information: full citation, abstract, references, index terms

In the last decade, it has become apparent that embedded systems are integral parts of our every day lives. The wireless nature of many embedded applications as well as their omnipresence has made the need for security and privacy preserving mechanisms particularly important. Thus, as field programmable gate arrays (FPGAs) become integral parts of embedded systems, it is imperative to consider their security as a whole. This contribution provides a state-of-the-art description of security issues ...

Keywords: Cryptography, FPGA, attacks, cryptographic applications, reconfigurable hardware, reverse engineering, security

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